NOISE ELEMENT

[Adopted April 1989]

Introduction

Scope and Role of the Noise Element

Noise Elements are often very technical, statistical and replete with jargon that most people do not understand and most often do not care to understand. Noise is defined in terms of complex mathematical formulas which assign a number to what people hear. The numbers are further complicated by the fact that noise is described much like earthquakes are, that being a logarithmic mathematical description, similar to the Richter Scale. Numbers associated with temperature are much easier to perceive and understand than numbers associated with noise. People feel temperature: 95 degrees and people are off to the beaches; 30 degrees people are indoors in front of a fireplace. The noise that wakes one in the middle of the night is just plain loud and unacceptable; no number is associated with the intrusion. The numbers assigned to temperature are derived from a linear scale, an average daily, weekly, or monthly temperature is just that, an average; there is no complex mathematical weighting to temperature averages as there is with noise numbers. The one thing the two classification systems have in common is the higher the number associated with temperature the warmer the weather. The higher the number associated with noise the louder the noise.

The Noise Element, must by state planning law, contain an analysis and quantification of the noise levels throughout the community. The Noise Element must consider and evaluate noise sources and noise sensitive uses and the relationship between the two throughout the planning area. Political, economic, social and personal dispositions toward noise are infused into the planning process. Previous land use decisions, like the location and extent of public transportation modes such as BART and bus lines and the airport; the location of industrial activities; and the location and relationship of sensitive receptors, such as residential areas, hospitals, schools, open spaces, and libraries, play an important and complex role in the analysis.

Land use and transportation patterns in Daly City are well established. A choice does not exist to move major transportation corridors or the airport in order to reduce noise exposure. The task ahead, then, is to identify and quantify the source of noise in the community; and develop a goal, objectives and policies to reduce existing and minimize future noise impacts.

State Planning Law

State planning law requires every city and county to adopt a Noise Element. The Noise Element must accurately reflect the noise environment, stationary sources of noise and noise impacts on local residents. A Noise Element must contain a discussion of the methods to implement noise policies and standards that comply with state noise insulation standards. Section 65302 (f) of the Government Code states that a Noise Element address:

- identification and appraisal of major noise sources;
- existing and projected levels of noise and noise contours for major noise sources;
- determination of the extent of "noise problems" in the community; and,
- identification and implementation of ways to reduce noise in order to protect the residents from excess noise exposure.

Many of the methods used to typify the noise environment involve complex measuring and computer modeling techniques. Many factors, as will be discussed later, play in the selection of the future projected year for noise contour mapping. A Noise Element is a document which is used to guide land use decisions and, as is the case with all the elements of a General Plan, it is used in conjunction with the other elements.

Summary of Findings

Five 24-hour and thirteen short-term noise measurements were taken throughout Daly City in September of 1987. Freeway and major arterial roadway noise has increased by approximately five decibels since noise measurements were taken in 1976 for the 1978 General Plan. Noise levels experienced in the Serramonte area due to aircraft fly-overs have decreased by ten decibels since 1976. Increases in noise levels for the projected future year, 1997, will be

insignificant throughout the City. Increases are expected to occur along freeways and arterials and in the Hillside area. The increases are expected to be a result of residential development; the BART Tail Track expansion; and higher traffic volumes. Increases are projected to be between 0.5 to 5 decibels. Aircraft noise levels are projected to drop below the 60 dBA, CNEL contour.

Background Information

Introduction

Noise terms and concepts are often complex and difficult to understand. The following two sections contain a definition of many of the terms used to describe noise and a discussion of noise concepts. The following terms and the concepts they are founded on are also used in other planning documents such as environmental impact reports; acoustical studies; the building, construction and engineering trades; and the aeronautic and transportation fields, to describe noise. Every attempt is made, in the following two sections, to introduce the technical terms used to describe noise and to reduce them to an understandable working vocabulary while retaining the intent of the meaning. An attempt is also made to use the terms in such a manner that the reader may then be able to identify, and understand, the terms and concepts in other documents even though they may appear in their most technical form.

Understanding Noise Terms

Noise Descriptors

A-Weighted Sound Level (dBA) is the sound level in decibels as measured on a sound meter using a filtering device that responds to sound similar to the way the human ear hears sound. There are other filtering devices used when measuring sound, which measure different components of the sound. Since other measuring devices exist, it is important to indicate which device is used; this is why the acronym dBA accompanies measurements taken with the A-filtering device.

Community Noise Equivalent Level (CNEL) is the average equivalent A-filtered sound level during a 24-hour period. The value is obtained after the addition of 5 decibels to sound levels in the evening from 7:00 P.M. to 10:00 P.M. and after the addition of 10 decibels in the night after 10:00 P.M. and 7:00 A.M. The CNEL weights the actual noise measurements taken to account for the increased sensitivity people have to noise during the evening and nighttime hours. Daly City's Noise Element employs this noise weighting metric.

Decibel is a unit of measurement used to describe the level of a given sound.

Energy Noise Equivalent Level (L_{eq}) is the sound level corresponding to a steady state sound level containing the same level over a given period of time. Sound levels vary over a period of time, more so than temperature over a 24-hour period. Remembering that the unit sound is measured is logarithmic, the L_{eq} is the closest value to an average for a given period of time.

L_{max} is the highest noise level recorded during the measurement period. The L_{max}, then, represents one intrusive noise event, there may be others of less intensity, during the measurement period. Intrusive noise can typically be from such sources as an aircraft fly-over, a horn or siren, or construction activities.

Noise Reduction

Attenuation refers to the lessening or reduction of a noise level. Noise attenuates by travelling a distance from the source or by other mechanisms such as absorption or reflection. The placement of buildings, sound walls, and noise insulation features are predicated on noise attenuation. Noise attenuates at different rates depending if the noise source originates from a point or line source and if it travels over a hard or soft surface and if it is absorbed or reflected by a noise mitigation feature. Basically five things are taken into consideration when calculating noise attenuation: the type of noise; level of noise at the source; distance the noise travels to the point of interest; type of terrain over which the noise travels; and the presence or

absence of noise barriers.

Line of Site is often used when describing the noise source and noise receiver relationship. Basically, if one can see the noise source then one can hear the noise; if however, the line of sight is broken by a wall, building, mountain, or other barrier, then the noise source is reduced accordingly. Various features reduce noise at different levels and these differences are discussed throughout this Noise Element.

Miscellaneous Noise Terms

Ambient Noise Level constitutes the "normal" or "background" noise components and level of noise at a given location. Ambient noise is a composite from all noise sources that are experienced in a given location. Ambient noise in a residential area, for example, could consist of sounds of people talking, dogs barking, children playing and cars passing by. Ambient noise in an office might consist of people talking, telephones ringing, and the sound of typewriters or computer keyboards clicking.

Intrusive Noise is a noise that intrudes over the existing ambient noise in a given location. The relative intrusiveness of the sound depends upon the amplitude, duration, frequency and time of occurrence of the intrusive noise as well as the level of the ambient noise.

Noise Concepts

Background

Airborne sound is a rapid fluxuation of air pressure above and below atmospheric pressure. Sound levels are measured in decibels using a measuring device (dBA) which closely approximates the way the human ear responds to sound. The threshold of human hearing roughly corresponds to 0 dBA while the threshold of pain is approximately 120 dBA; 120 dBA corresponds to a jet taking off at 200 feet from the source (see Figure 2.1, 'A-Weighted Sound Levels'). Decibels are calculated on the logarithmic scale; an increase of 10 decibels represents a ten-fold increase in sound level, however, the sound is perceived as twice as loud. For example, 65 dBA is perceived to be about twice as loud as 55 dBA. An increase of 3 dBA is just barely perceptible to the human ear; a 5 dBA increase is clearly noticeable; and a 10 dBA increase is heard as an approximate doubling in loudness.

The frequency of a sound refers to the number of pressure fluctuations per second in the sound. The unit of measurement is the hertz (Hz.) or cycles per second (cps). Most sound is not comprised if a single frequency, but a broad band of frequencies. The characterization of sound level magnitude with respect to frequency is called the sound spectrum. The sound spectrum of the human ear, is typically described in terms of octave bands which separate the audible frequency range into ten segments, from 20-20,000 Hz.

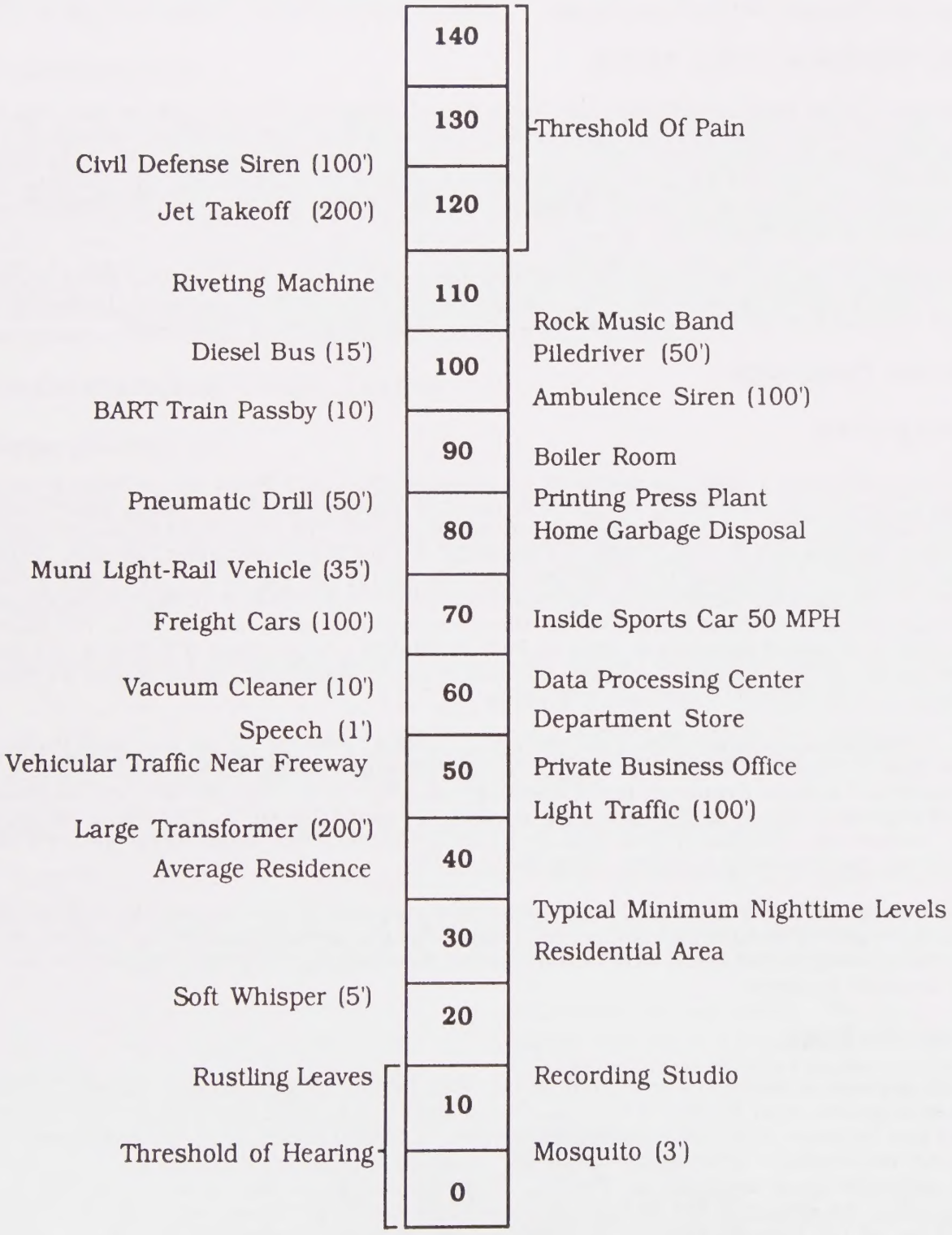
The human ear has a decreased sensitivity to low frequencies and extreme high frequencies. The A-weighted measuring device, referenced above, de-emphasizes the importance of frequency components below 1,000 Hz. and above 5,000 Hz. approximately the way the human ear responds to sound.

Noise Defined

Noise is generally defined as unwanted sound. Whether a sound is unwanted or not depends on when it occurs, what the listener is doing when it occurs, and the characteristics of the sound and how intrusive it is above background levels. Consider for example the characteristics of sound: the loudness or intensity; frequency; duration; repetition rate; time of occurrence; and its unfamiliarity or uniqueness. Overlay those characteristics with the characteristics of the listener or the situation: the ambient noise; an individual's particular sensitivity to noise; the activity of the listener; and the listener's perceived need or justification of the noise. The electronic beep of a person's wrist watch during a symphony or theatre performance may indeed be an unwanted sound (noise). The person hearing the beep of the wrist watch every half hour during the performance may be distracted from enjoying the performance and may be very annoyed, perceiving the sound as an unnecessary intrusion. The same beep of a wrist watch during the day in an office may be inaudible, and if it were audible, it may be perceived as necessary, and therefore justified, as a method to track time while working on various projects.

Figure 2.1

A-Weighted Sound Levels



(100') Distance in Feet Between Source and Listener

Source: Charles Saltner, Associates, 1987.

In sum, response to noise is somewhat subjective and is also dependant upon the level of the noise; the frequency composition of the sound; the variation of sound over time; as well as the disposition and activity of the listener.

Noise Travel and Attenuation

Noise originates from two basic sources, line and point sources. Line sources include such things as a stream of moving traffic, a moving train, conveyor belt, or even a river. Noise from a line source produces parallel sound waves moving in a line outward from the source. Point source noise originates from a single source such as a horn, a motor and machinery. Point source noise produces waves which travel in a circular pattern, much similar to that of waves of water travelling from a stone dropped in a pond. The distinction between the two sources is important in terms of the rate of noise attenuation.

Attenuation refers to the lessening or reduction of a noise level. Noise attenuates by travelling a distance from the source and by other mechanisms such as absorption or reflection. A factor in determining the rate noise will attenuate is whether the noise travels over hard or soft terrain. Hard terrain includes asphalt, concrete, steel, and buildings such as low and high rises constructed of such materials. Hard surfaces tend to reflect noise and may indeed block noise from passing through which is the desired end result. A soft surface includes barren or landscaped earth and acoustically absorptive materials. Soft surfaces tend to absorb noise more than hard surfaces. Noise from a line source will attenuate approximately 3 dBA per doubling of distance from the source in hard terrain and approximately 4.5 dBA per doubling of distance in soft terrain. Point source noise will attenuate approximately 6 dBA per doubling of distance from the source in hard terrain and approximately 9 dBA per doubling of distance in soft terrain.

Reflection also attenuates noise. Noise strikes a hard surface and is reflected back towards the source as opposed to passing through to a sensitive receptor, like a residential area. A noise wall along a freeway is an example of how reflection works to reduce noise. Noise from traffic strikes the wall and is reflected back to the freeway corridor. Noise along the freeway is increased however as less noise passes through to the noise sensitive area. Often a sound wall is coated with acoustically absorptive material which reduces the noise reflected back towards the freeway. Reflection can also increase noise by diverting noise toward a sensitive area. High rise buildings, for example, surrounding an open space on three sides with a roadway adjacent to the fourth side, would tend to reflect traffic and other noises in the area off the walls into the open space. Building placement and configuration as well as noise insulation features are all important components in noise analysis and noise prevention and mitigation programs.

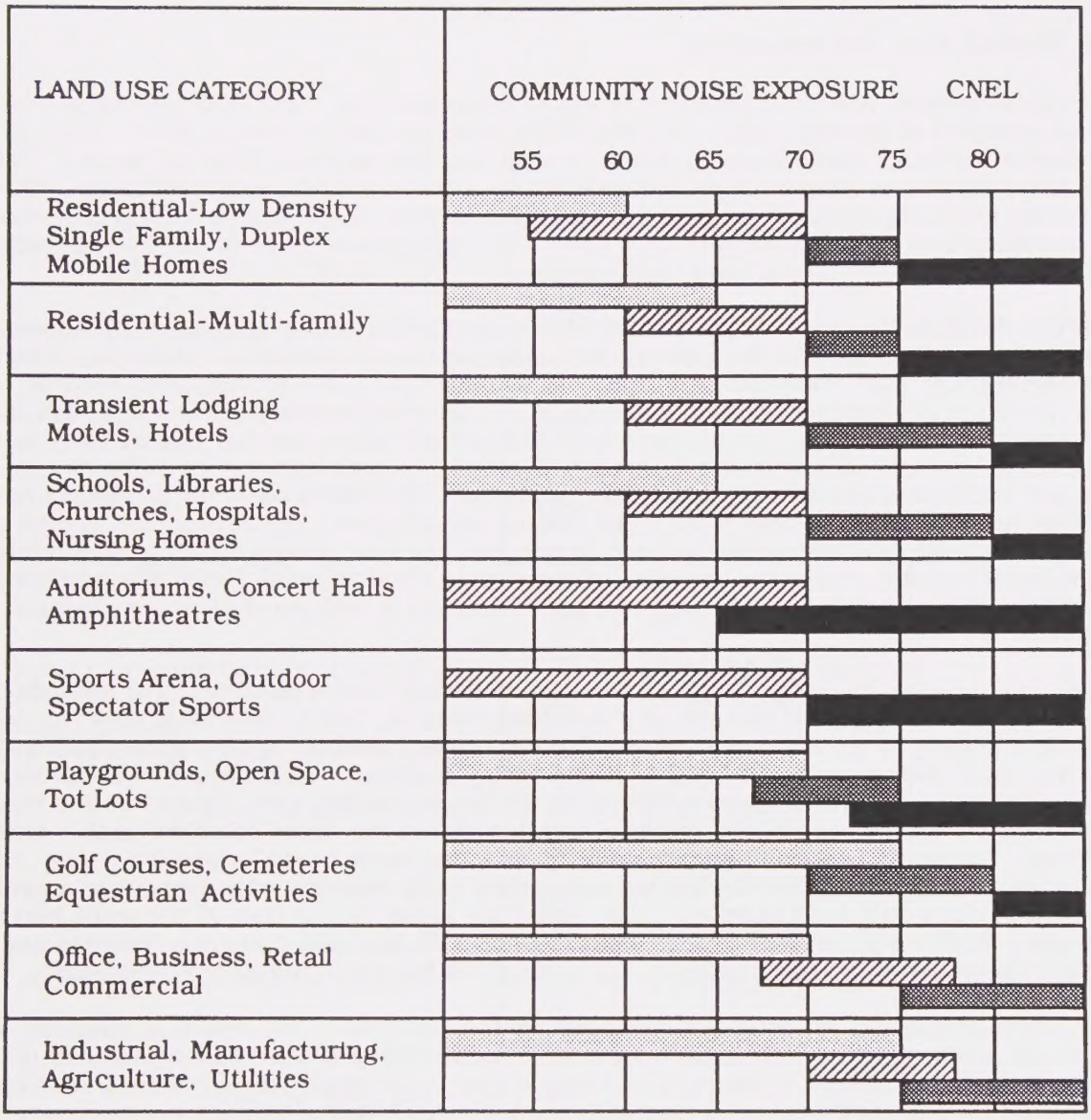
Noise is also attenuated by striking a building. Some portions of the building envelope will reflect noise, some portions will absorb noise and some noise will be transmitted through to the interior of the building. Typically a building of pre 1950 construction (without additional noise insulation features) and with partially open windows will attenuate outside noise by 10-15 dBA; post 1950 construction and windows closed will attenuate noise up to 25 dBA. Noise Compatibility Guidelines are based on this differential.

Noise Compatibility Guidelines, developed by the State Office of Noise Control, establish certain criteria for noise levels with regard to land use compatibility. Each category of land use enjoys a range of noise levels considered compatible with the use and the noise levels may increase provided certain noise insulation features are employed (see Figure 2.2, 'Noise Compatibility Guidelines'). The guidelines are predicated on the fact that outdoor noise will attenuate to interior levels determined to be healthy as established by the Environmental Protection Agency. Daly City adopted the Noise Compatibility Guidelines in 1978.

Noise Sources, Descriptors and Sensitive Receptors

The major contributor to the noise environment, particularly in residential areas, is traffic; noise from aircraft is also a contributor. Other aspects of urban life such as retail and industrial activities also contribute to the noise environment. Although a single sound level value may adequately describe ambient noise at a given instant in time, community noise levels vary continuously. Ambient noise is a combination of distant noise sources which produce a relatively steady noise having no identifiable source. Distant sources change gradually throughout the day, and may include traffic, wind in trees, and land uses such as commercial activities. Superimposed on this slowly varying background is a succession of

Figure 2.2
Noise Compatability Guidelines



NORMALLY ACCEPTABLE

Specified land use is satisfactory, based on the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems will usually suffice.

NORMALLY UNACCEPTABLE

New construction should generally be discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction should generally not be undertaken.

Source: State Department of Health Services-Office of Noise Control

identifiable or intrusive noise events. Statistical descriptors were developed to describe the time-varying character of ambient noise. The Noise Equivalent Level (L_{eq}) is such a descriptor and is representative of an equivalent constant sound level over a given period of time. The actual noise measured during a given period of time, say 24 hours, varies; a single noise event during the time period may have reached 90 dBA (the L_{max}) and the lowest may have been 45 dBA while the L_{eq} representing that time frame may be 55 dBA, L_{eq}. The 90 dBA level represents the most intrusive noise event during the measuring period and is referred to as the L_{max}. Intrusive noise events are of particular importance in understanding and assessing aircraft noise impacts.

Residential units, schools, hospitals, extended care facilities and open spaces are land uses considered more sensitive to high noise levels or changes in ambient noise than commercial or industrial land uses. Noise sensitive land uses, or sensitive receptors as they are often termed, are considered sensitive because people are usually resting, relaxing, convalescing, learning or enjoying recreational activities and excessive noise can impinge on these activities. Conversely, land uses that are less sensitive to excessive noise levels or changes in the ambient noise environment include industrial, commercial, and transportation related uses.

Community Noise Equivalent Level

People are usually more sensitive to noise in the nighttime than they are during the daytime. Two factors contribute to this increased sensitivity. First during the evening and nighttime, outdoor ambient noise levels are generally lower than the daytime. Most offices and businesses are closed and traffic has lessened or is non-existent. Second, household noise levels decrease also, as people are usually eating, relaxing, conversing and sleeping. Eating, relaxation, conversing, and sleeping are noise sensitive activities and because of this, changes in exterior nighttime noise levels can be more noticeable and annoying than such changes are during the day.

Intrusive noise can be distracting and it can also result in adverse health affects. The Community Noise Equivalent Level (CNEL) takes this increased human sensitivity to noise in the evening and nighttime into account. The CNEL calculation divides the 24-hour day into three time periods: daytime (7:00 A.M. to 7:00 P.M.) evening (7:00 P.M. to 10:00 P.M.); and nighttime (10:00 P.M. to 7:00 A.M.). The evening sound levels are assigned a 5 decibel penalty (or weighting) and the nighttime sound levels are assigned a 10 decibel penalty (or weighting) prior to averaging with daytime hourly sound levels. A calculated CNEL value for a given noise environment and land use is compared to the Noise Compatibility Guidelines; which are applied to new proposed development; if the noise environment exceeds a certain criterion noise insulation standards are employed and sometimes, if necessary, new construction is prohibited (see Figure 2.2, 'Noise Compatibility Guidelines'). The CNEL noise metric is a standard that when adhered to provides for a quieter evening and nighttime environment.

Effects of Noise on People

Hearing loss and human stress reactions are common effects that noise has on people. Noise can also interfere with activities such as speech, sleep and learning. The Environmental Protection Agency (EPA) has established noise thresholds that, if exceeded, are hazardous to human health.

The EPA has determined that 70 dBA, L_{eq} is the level of environmental noise, at a 365 day a year exposure, which will protect the population from hearing loss. Please note that 70 dBA, L_{eq} is not a time weighted value but represents an actual fairly continuous noise state and in actuality is a more severe noise level than 70 dBA, CNEL. The EPA has identified 75 dBA, L_{eq} as the 8-hour work exposure threshold necessary to protect from hearing loss. The sound of human speech is typically 60 to 65 dBA; noise begins to interfere with a listener's hearing when it exceeds 55 dBA; at 50 dBA sentence intelligibility is unaffected. Continuous noise in excess of 55 dBA inside a classroom can interfere with the hearing, concentration and learning of the students. Continuous noise in excess of 65 dBA will interfere with sentence intelligibility 20 percent of the time and continuous noise in excess of 75 dBA will affect sentence intelligibility 100 percent of the time.

The EPA has not established threshold exposure criteria for the non-auditory effects of noise. The EPA has stated that the noise levels established to protect against hearing loss should be sufficient to protect the non-auditory effects of noise. Non-auditory effects of noise include physiological responses such as stress related conditions; high blood pressure, coronary disease, migrane headaches, fatigue, insomnia, hyper and hypotension, and digestive disorders.

Relationship to Other Jurisdictions and Documents

The following section identifies other policy making jurisdictions and documents that influence the effectiveness and implementation of the Noise Element. Daly City has no direct control over the agencies mentioned, but does however, work in a cooperative manner with the agencies. Particular documents listed in the following are used to assess the merits of a particular project, such as an environmental impact report.

Federal

Federal Aviation Administration (FAA)

The FAA administers a wide range of airport related programs. Air traffic control; safety inspections; noise abatement programs; and inspection of aircraft and security equipment are just a few of the programs and services the FAA administers. The FAA, through enabling legislation (Federal Aviation Regulations, Part 150), administers federal monies for noise abatement and mitigation. Noise mitigation programs include the insulation of homes that are within a particular noise contour (65 dBA, CNEL) originating from an airport. The FAA has many offices throughout the United States; the local office is in Burlingame.

State

State Office of Noise Control

A noise element of a general plan is required by state law to recognize the guidelines for noise element preparation set forth by the State Office of Noise Control (Government Code Section 65302 (f)). The extent to which a municipality recognizes and implements the guidelines is governed by case law and the applicability of the particular regulation to the needs and extent of development present in the municipality. The State Office of Noise Control is a branch within the State Department of Health Services. The Office of Noise Control works in coordination with the State Office of Planning and Research. The Guidelines, originally set forth in February 1976, have been revised since their inception. The Guidelines also set forth a methodological approach to drafting a noise element and include the Noise Compatibility Guidelines to guide land use decisions. The Noise Compatibility Guidelines are drafted in such a manner that allows a municipality to adopt them as the official criteria to guide future land use decisions. The Noise Compatibility Guidelines, as mentioned previously in this noise element, have been adopted by the City of Daly City (see Figure 2.2).

State Noise Insulation Standards

State noise insulation standards are required for multi-family development. The standards, contained in Title 24, California Administrative Code, Part 2, Chapter 2.35, are employed during construction. Insulation features result in reducing the ambient interior noise level of a multi-family dwelling to a level determined sufficient by the Environmental Protection Agency to protect the occupants from hearing loss and other effects resulting from excessive noise exposure. Noise insulation standards are required for multi-family residential development because multi-family development is permitted in an exterior noise environment that is approximately 5 dBA higher than single-family, and because multi-family dwellings are usually subject to more noise impacts from adjacent apartments than single-family development is to from an adjacent house. Employing such features as insulation of piping assemblies, electrical devices, recessed cabinets, bathtubs, soffits, heating, ventilating, and exhaust systems, floor and ceiling assemblies between separate dwelling units, and entrance doors from exterior corridors results in reducing noise impacts to multi-family units.

California Department of Transportation (CALTRANS)

The California Department of Transportation Division of Aeronautics drafts and adopts noise standards that regulate public-use airports in the State of California. The standards and regulations are contained in Title 21 of the California Administrative Code, and they do address aircraft noise reduction. The Department periodically amends Title 21.

CALTRANS administers specific noise related programs along freeways in addition to that section of CALTRANS that administers aircraft noise regulations. The noise programs apply to mitigation of noise impacts to preexisting schools and residential uses along certain freeways. "New Construction or Reconstruction," Community Noise Abatement Programs," and "School Noise Abatement Program" are three noise abatement programs that CALTRANS funds and administers.

Local

Airport Related

Airport Master Plan

An Airport Master Plan is both a short-range (5 year) and long range (20 year) plan that provides for implementing changes in use of airport owned properties and facilities. The plan also provides for the orderly growth of the airport and seeks to minimize noise and safety impacts.

Daly City is in a unique situation, as is the rest of San Mateo County, in terms of airport jurisdiction. San Francisco International Airport is located in San Mateo County but is regulated and governed by the Airports Commission of the City and County of San Francisco. The San Francisco International Airport periodically updates the Airport Master Plan; like other environmental documents and plans, affected cities, counties and the public are encouraged to comment.

San Mateo County Regional Planning Committee

Each county that is affected by an airport must establish an Airport Land Use Commission (ALUC) to regulate and direct land use. State law (State Aeronautics Act, Article 3.5 Section 21670, as amended) does provide that a county's legislative body may designate an existing body as the authority to regulate airport matters.

The San Mateo County Board of Supervisors designated the Regional Planning Commission (RPC) as the County's official Airport Land Use Commission. The RPC is represented by council persons from Daly City, Brisbane, San Bruno, Milbrae, Burlingame, Foster City, Redwood City, San Carlos, Half Moon Bay and the County of San Mateo. The RPC, then, is the County's Airport Land Use Commission. The RPC does include a sub-committee known as the Airport Land Use Committee which advises on airport/land use matters. The Airport Land Use Committee should not be confused with the Airport Land Use Commission, which in San Mateo County is synonymous with the Regional Planning Commission.

The RPC prepared an airport land use plan in 1973. The Plan has been amended three times since its inception; the latest revision being March 21, 1981. The Plan also addresses land use decisions near the airport in terms of safety and noise issues, appropriate types of land uses, building height restrictions for new construction and construction building standards. Local general plans and zoning regulations must be consistent with the RPC's ALUC Plan, unless the local legislative body makes specific findings for an override.

San Francisco International Airport

The San Francisco International Airport recently adopted a revised noise regulation that governs airport operations. The airport receives its authority to draft and adopt a noise regulation from Title 21, Sub-chapter 6 of the California Administrative Code, and from the Charter of the City and County of San Francisco. The regulation is promulgated in order to provide for the continual reduction of cumulative noise impacts stemming from aircraft operations. The regulation stipulates the types, times, and any applicable grandfathering period that certain aircraft may operate at the airport. Cities, counties and the public may

comment on the regulation, during the review period, and the comments are responded to in a fashion similar to that of an environmental impact report.

Existing Noise Environment

Introduction

This section describes the existing noise environment in Daly City. The section first describes various noise sources and sensitive receptors in general, and in Daly City. A discussion of the noise monitoring and modeling program that was used to develop the existing and projected (1997) noise contours in Daly City closes the section.

Description of Noise Sources

Continuous Sources

Noise sources include freeways, arterials, and local major streets; heliports, airports, and aircraft overflight areas; rapid transit lines; and to a lesser extent commercial and industrial land uses. The level of noise along and nearby a freeway, arterial, or local street is a function of the traffic volume, the speed of the traffic, and the types of vehicles in the traffic stream (car, light or heavy truck). Heavier volumes of traffic produce more noise than lighter volumes of traffic. Slower or congested traffic travelling along a freeway produces more noise than traffic travelling at the posted freeway speed. Heavy trucks, tractor-trailers and diesel buses are noisier than standard passenger cars. Traffic volumes, however, must double over existing volumes for there to be a perceptible (3 dBA) increase in noise levels. Traffic noise is usually more pronounced during morning and evening peak commute hours. Major traffic noise sources in Daly City are Interstate 280, Cabrillo Freeway and Skyline Expressway; John Daly, Hickey, Serramonte, Callan, Gellert, San Pedro, South Hill, Bayshore, and Lake Merced Boulevards; Southgate, Eastmoor, St. Francis, Geneva, San Jose, El Camino, and Bellevue Avenues; East Market, School, Mission, and 87th Streets; and King Drive.

Heliport and airport noise sources tend to be intrusive noise events that are short in duration. Intrusive noise events resulting from aircraft fly-overs can reach 90-100 dBA, L_{eq} for the brief (few seconds) fly-over period. Intrusive noise events resulting from aircraft fly-over can raise the hourly noise level to 75 dBA, L_{eq}. The San Francisco International Airport is the only airport that has an affect on Daly City. Noise from aircraft fly-overs affect the Serramonte neighborhood in the southeastern tip of the City. Seton Medical Center is the location of the only heliport in Daly City. Noise impacts from heliport operations are non-existent as annual use of the heliport is less than 12 times per year and flight paths are directed away from the residential neighborhoods.

Rapid transit lines, such as Bay Area Rapid Transit District (BART) are a source of noise. Noise from BART trains is less intrusive and less intense than aircraft fly-overs. The highest hourly noise level from BART operations, in Daly City, is less than 70 dBA, L_{eq}. Currently the influence of BART ends in the northernmost portion of the City at DeLong Street. BART will, however, be extended a portion of the City, near unincorporated Colma. The build-out year for the future noise environment contours, following this section, analyzes the BART extension in terms of the noise it may produce as a result of the expansion. Bus lines that serve the BART Station are a source of noise in Daly City. The noise from bus operations drops dramatically after midnight when BART ceases running for the day.

Commercial and industrial land uses are a source of noise. Commercial land uses generate vehicular and pedestrian traffic both of which add to the noise environment. Commercial uses, by their nature, include noise sources such as the delivery of goods to a site; the unloading of the delivery; and sometimes minor processing of the goods. Commercial uses in Daly City are centered along the Mission Street corridor, at shopping centers such as Westlake, Serramonte, Skyline Plaza and St. Francis Square, and pocketed in neighborhood commercial areas such as small 'mom and pop' grocery stores that serve an immediate neighborhood.

Industrial noise sources are usually more intrusive in nature than commercial noise sources. Delivery of raw and finished materials, usually in large tractor-trailers; use of heavy equipment such as saws, grinders and other machinery; and speaker systems add to the noise environment. Industrial land uses are minimal in Daly City; are centered in the Bayshore neighborhood; and are of a less intense nature than typical industrial uses.

Temporary Sources

The noise sources described above are fairly continuous noise sources. The noise levels the uses generate do vary over a 24-hour period, from business hours to evening hours, and they may cease on weekends, Sundays or holidays; their pattern, however is fairly continuous year round. Another type of noise worthy of mention is temporary noise generated from construction activities.

Construction noise is intrusive and can reach up to 105 decibels at fifty feet from the source for pile driving. Construction noise is shorter in duration than noise associated with fixed land uses. The typical time frame for construction noise is three to nine months. Construction noise is regulated in Daly City through the environmental review process by the Engineering and Planning Divisions. Typically, construction activities are limited to the daytime hours, 8:00 A.M. to 5:00 P.M. and prohibited on weekends and holidays. The time limitation protects residents near the construction activity from the higher noise levels during the noise sensitive times of the day (evening and nighttime) and noise sensitive times of the week (weekends when people are usually home).

Earthmoving equipment such as compactors, backhoes, tractors, trucks and graders range from 70 to 95 dBA at 50 feet from the source. Impact equipment such as pneumatic wrenches, jack hammers and pile drivers generate higher levels of noise. The noise range for this type of equipment is 80 to 105 dBA at 50 feet from the source. The types of equipment and the noise levels associated with the equipment is shown in Figure 3.1, 'Construction Equipment Noise Levels.'

Description of Sensitive Receptors

Residential areas, hospitals and extended care facilities, schools, libraries, and parks and open spaces are land uses that are considered more sensitive to high noise levels and changes in ambient noise levels. High noise levels and intrusive noise can disrupt relaxation and sleep, convalescing, and the enjoyment of open space and recreational areas.

Approximately 53 percent of Daly City is residential and of this, approximately 90 percent is low to medium density and consists of predominantly single-family and duplex units. This land use category also includes residential care facilities. Residential care facilities serve the elderly and physically and mentally handicapped individuals in a home setting.

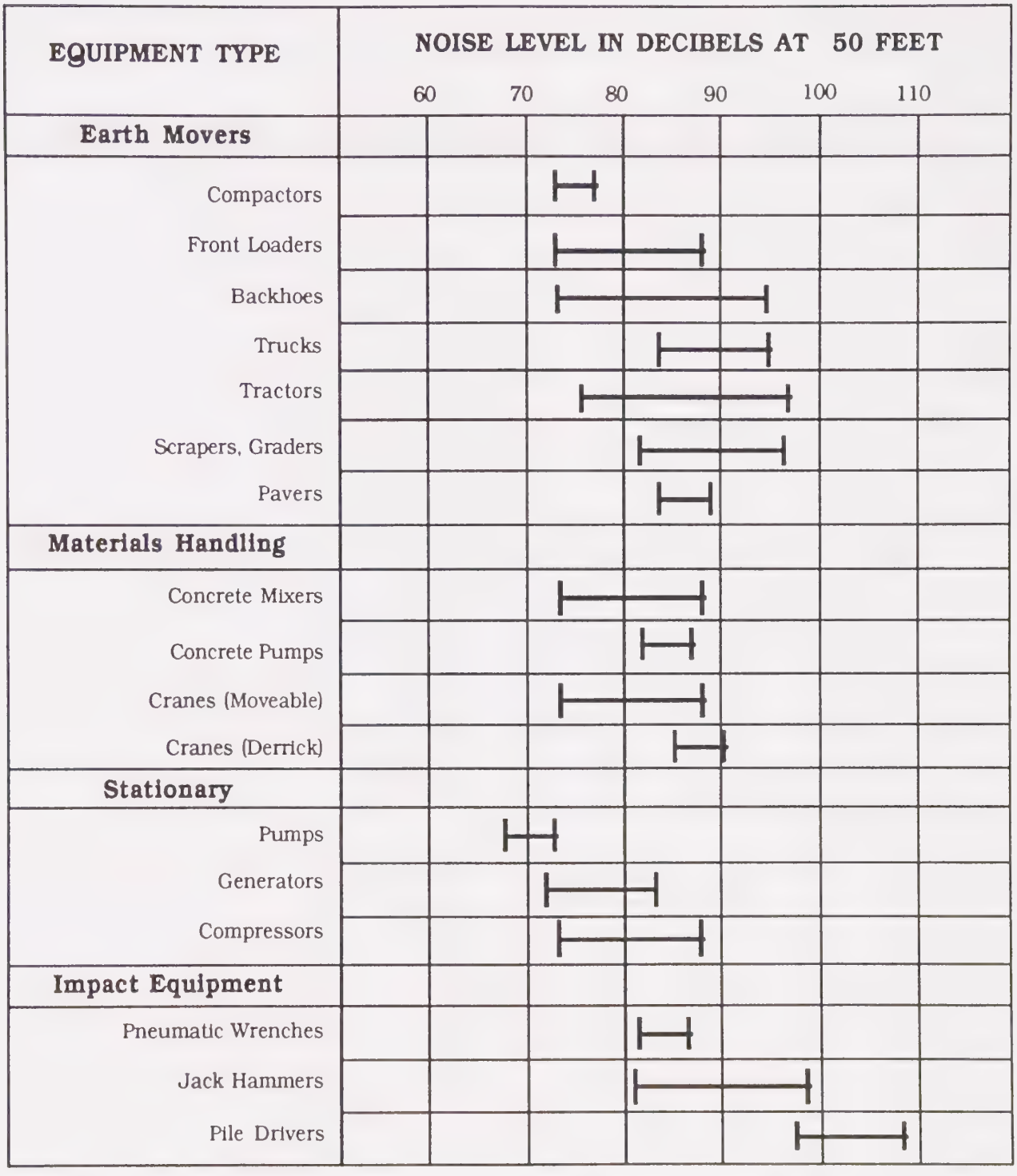
Seton Medical Center is the only hospital in Daly City. Other supervised medical care facilities include two skilled nursing homes and a third one is proposed. Additionally there are two retirement communities in Daly City designed to provide group residential care for the elderly.

Daly City has twenty-seven schools and four libraries. Approximately sixteen percent of Daly City is open space. Approximately fourteen percent of the total open space is public and includes tot lots, and state, regional and local parks. Fifty-three percent of the total is open space for preservation because of environmental factors that render the site undevelopable such as soil and slope instability or because of lack of infrastructure serving the site. Thirty-two percent of the open space is private and includes golf courses, country clubs and horse stables. Although there are different categories of open space the expected use of the space is the same; relaxation, meditation and recreation. The general location of sensitive receptors in Daly City is shown on the 1987 General Plan Land Use Map located on page 57 of the Housing, Land Use and Transportation Elements of the 1987 General Plan.

Noise Monitoring, Modeling and Mapping Methodology

State Planning Law (Government Code Section 65302) requires cities to prepare noise contours around major noise sources. The requirement is designed to identify areas of noise impact. Daly City retained the services of Charles Saltner, Associates, acoustical consultants to conduct a noise monitoring program. The program included five 24-hour noise measurements and thirteen short-term noise measurements. (See Map 2.1, 'Noise Measurement Locations,' for the location of the noise measurements). Noise contours were developed and mapped in five decibel bands using the Community Noise Equivalent Level (CNEL) metric.

Figure 3.1
Construction Equipment Noise Levels



Source: Based on available data samples from various Environmental Impact Reports.

NOISE MEASUREMENT LOCATIONS

24-Hour Locations

Short-term Locations

SCALE IN FEET

Planning Division August 1988

In establishing noise contours for land use planning it is customary to ignore noise attenuation afforded by buildings, roadway elevations and depressions, and to minimize the barrier affect of natural terrain features. The result is a worst-case estimate of the existing and future (projected) noise environment. The purpose of noise contours is to identify the potential need for more detailed acoustical studies, not to predict with certainty the noise level throughout the City. The assumption is that it is desirable to overestimate the potential noise at a future sensitive development site, than to underestimate the noise environment and allow for potentially incompatible land use development. Buildings may be removed as a part of future development which would result in eliminating the particular noise attenuation feature. The noise attenuation provided by existing earthen berms or terrain may also be diminished by future development.

Two types of noise contours were developed; ones reflecting traffic noise and ones reflecting aircraft noise. The traffic noise contours, produced by computer modeling, utilize the time tested Federal Highway Traffic Noise Prediction Model. This model represents more than 20 years of traffic noise research. The model was updated to include more recent studies conducted in California which incorporate the results of a quieter traffic stream due to quieter vehicle technology; California's rigid truck noise standards; and better road surfacing which also reduces noise levels.

The aircraft noise contour was developed by mathematical (logarithmic) extrapolation from the Airport's Remote Monitoring System data over the Runway 28 Departure flight track. The Monitoring Station data is the most reliable available in that it represents actual long-term measurement data rather than computer modeling. Noise from the airport has decreased from the measurements taken in 1976 and represented in the 1978 General Plan. Aircraft technology has been responsible for reducing noise from aircraft by approximately 20 decibels. The Future Noise Environment section will show that the noise from aircraft will diminish even further in future years.

Results of Noise Monitoring: Existing Conditions

The Environmental Protection Agency has established 70 dBA, L_{eq} as the noise level requisite to protect the public from the health effects of severe noise exposure year round. This level also assumes a 24-hour day exposure. The L_{eq} (Noise Equivalent Level) is a fairly constant noise level and is less stringent than the CNEL. CNEL values are typically three to four decibels higher than the L_{eq}. Daly City meets the 70 dBA, L_{eq} exposure level throughout the City in areas where there are sensitive receptors except for the second story of some homes along Station Avenue as discussed under Location C below. The following includes a brief description of the five 24-hour noise measurement locations and the results. See Map 2.2, 'Existing Noise Contours,' on page 69 for a depiction of the noise contours.

Location A: Serramonte Area

The purpose of this measurement was to characterize the noise exposure in the Serramonte neighborhood from aircraft departing westbound from the San Francisco International Airport. The background noise in the area is 50 to 55 dBA, L_{eq} which is relatively low. The maximum noise from aircraft flyovers reaches 90 to 100 dBA, L_{eq} for the brief few seconds of the flyover. As a result, the hourly noise levels fluxuate greatly in this neighborhood depending on airport activity. Figure 3.2, 'Hourly Leq's in the Serramonte Area' demonstrates this fluxuation and Table 3.1, 'Aircraft Events in the Serramonte Area' illustrates the maximum noise levels and the time of those noise levels associated with aircraft activity. The CNEL in this location is 69 dBA and the L_{eq} is 64 dBA.

EXISTING NOISE CONTOURS

- ‹60 CNEL
- 60-65 CNEL
- 65-70 CNEL
- ›70 CNEL
- 60 CNEL Aircraft

Planning Division August 1988

Table 3.1
Aircraft Events In the Serramonte Area /a/

Time	Lmax
1:34 p.m.	97
1:36 p.m.	90
2:07 p.m.	92
2:49 p.m.	98
3:56 p.m.	87
9:45 a.m.	90
11:40 a.m.	93
1:58 p.m.	90
2:19 p.m.	93

/a/ Date: 9/29/87 through 9/30/87.
Source: Charles Saltner, Assoc.
and San Francisco International Airport
Remote Monitoring Program

Location B: Clarinda Drive

The purpose of this measurement is to quantify the noise exposure to the residents along Clarinda Drive. Residences in the area are somewhat protected from freeway noise as the freeway is elevated and thus breaks the line of site from the noise source to the receiver. The neighborhood is exposed to some aircraft related noise from departing flights. The CNEL in this location is 63 dBA and the L_{eq} is 59 dBA.

Location C: Station Avenue

The purpose of this measurement is to quantify the noise exposure to the second story of homes along Station Avenue. The second story of the homes are exposed to higher noise levels than the first floor; this is because the first floors are shielded from noise by existing terrain. The terrain shielding reduces noise exposure on the first floor by 5 to 10 dBA over that of what is experienced on the second floors.

The noise environment in this location is dominated by traffic travelling along Interstate 280. The CNEL is 75 dBA and the L_{eq} is 72 dBA. These levels represent the worst case exterior noise exposure at the second story. The first story CNEL and L_{eq} values are approximately 5 to 10 decibels lower, 65 dBA, CNEL and 62 dBA, L_{eq} .

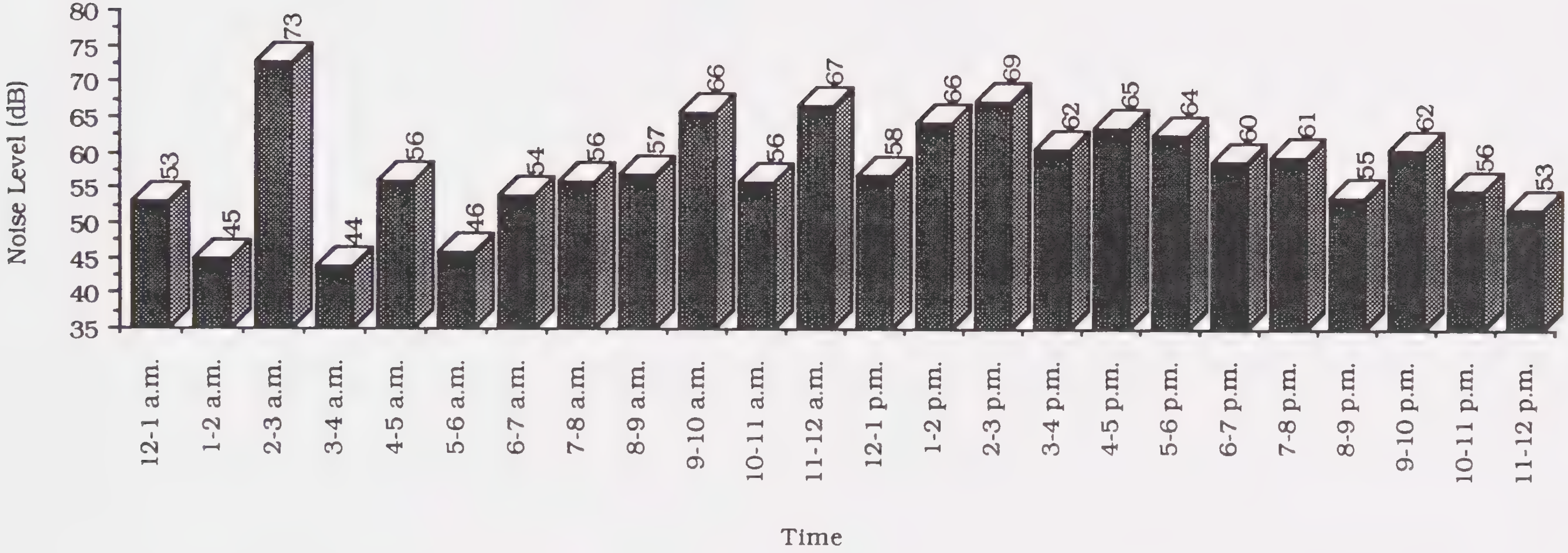
Location D: Mission Street

The purpose of this measurement location is to quantify the noise exposure to residents located on the east side of Mission Street behind the commercial frontage. Homes on the west side of Mission Street are at a lower elevation than street level and are thus shielded from traffic noise. The extent of shielding is approximately 10 decibels; so quantification of the east side of Mission Street represents a worst case analysis. The CNEL is 68 dBA and the L_{eq} is 65 dBA.

Location E: BART

This measurement location quantifies the noise exposure of residences on the east side of the BART Station along Delong Long Street. The major source of noise in the area is not BART trains but the diesel buses serving the BART Station. The buses are closer to the homes than the BART trains and are thus more intrusive than the BART trains. The noise level in the area drops significantly after midnight because the trains and the buses serving the station cease operations. The CNEL in this area is 70 and the L_{eq} is 66 dBA.

Figure 3.2
Hourly Leq in Serramonte Area
Midnight to Midnight



Source: Charles Salter Associates, 1987
September 29 and 30, 1987

Projected Future Noise Environment

Introduction

The following section describes the projected future noise environment in Daly City. The projected future year selected on which to base the noise contours is 1997. Many development factors entered into selection of this year. The BART expansion and tail track is scheduled to be complete; various larger residential development projects throughout the City will be complete; smaller infill commercial and housing development will be complete; and land axnnexations will be complete. All of these factors will affect the noise environment as the uses will increase traffic; increase the population; and intensify the land uses in some areas. See Map 2.3, 'Projected Noise Contours' for the contours associated with the following discussion.

Future Noise Environment Predictions

The increase in the CNEL noise exposure levels between the existing conditions and the 1997 future conditions is low throughout the City. Hillside Boulevard is projected to increase between one and five decibels. A three decibel increase is barely perceptible to the human ear. A five decibel increase will be noticeable. The Hillside area, however, will remain in a safe noise range of 60 to 65 dBA, CNEL. The 65 to 70 dBA, CNEL will remain within the road right-of-way. Junipero Serra and John Daly Boulevards and East Market Street will increase by 1 dBA. Serramonte Boulevard will increase by approximately 1.5 dBA. Hickey Boulevard will increase by 2 dBA and Skyline Boulevard and Interstate 280 will increase by 0.5 to 1 dBA. These incremental increases in the noise environment are insignificant; they will not be perceptible to the human ear and will occur within the roadway right-of-way.

The CNEL for aircraft noise is predicted to be eliminated over the ten year future prediction period. This prediction is based on quieter aircraft technology and stricter regulations surrounding aircraft operations. An absolute prediction, however, can not be made due to the lack of data on future airport traffic volumes.

PROJECTED NOISE CONTOURS

- ‹60 CNEL
- 60-65 CNEL
- 65-70 CNEL
- ›70 CNEL

Goal, Objectives and Policies

The Noise Goal

This section of the Noise Element contains a discussion of the goal, objectives and policies the City has outlined in order to promote a noise environment that is safe and includes a balance of the diverse and essential objectives of the City. The noise goal reflects the general direction the City wishes to advance. The objectives represent actions which can be measured over time, that provide a general direction toward achievement of the goal, while the policies reflect more specific actions that the City will take in order to attain the noise goal. The City's Noise goal is:

> **"Promote a noise environment that reflects a balance of the various City objectives while providing an environment that maintains a healthy living environment; fosters relaxation and recreation; is conducive to the work environment; and provides pleasant living conditions."**

Many factors of this goal must be considered. First of all, objectives that must be considered in conjunction with noise concerns include the provision of housing for all segments of the City; the provision of an efficient transportation and infrastructure system; economic and commercial development in the City; and a safe and pleasant environment within which to work and live. No element of the General Plan can be considered in isolation from the others and this is particularly true of the Noise Element. For example, transportation modes are a major source of noise in Daly City. Not expanding roadways or improving roadway surfaces, when needed, can add to the noise environment and locating new housing close to major transportation corridors can expose residents to high noise levels. Take as another example the construction of housing, a City objective addressed in the Housing Element. Short term noise impacts occur during housing construction and additional people and traffic also add incrementally to the noise environment. Moreover, potential sites for infill housing must be carefully evaluated in terms of the location of noise sources that could impact future residents. Various City goals, must be considered as a whole and not incrementally, in order to provide a balanced and well functioning City.

Although various City objectives influence the noise environment, the noise goal should not loose sight of quality of life issues; such as quiet areas for relaxation and recreation. Open spaces, parks and private backyards should be maintained in a relatively quiet environment. An environment that one can relax in without intrusive or jarring noise impinging upon the experience is essential to personal well-being and the quality of life one enjoys in their community.

Conducive work environments and pleasant living conditions are easier to attain than providing quiet open space areas. A conducive work environment is of primary importance in worker productivity and physical well-being. Pleasant living conditions are tied to reduced noise levels in the home thus providing an environment where people can converse, dine, relax, and rest. Noise insulation standards and alteration of building placement in relationship to noise sources are two common methods utilized to reduce interior noise levels. Title 24 Noise Insulation Standards and careful site planning shall continue to be employed in Daly City as a means to reduce interior noise levels.

Noise Objectives and Policies

Objective 1. Identify and mitigate problem noise areas in the City.

Policy 1.1: *Use the noise contours to identify existing and potential noise impact areas in the City.*

The noise contours provide a reliable data base for assessing noise impact areas. The contours should be used in conjunction with the State Office of Noise Control Guidelines (Guidelines) to identify areas where land use incompatibilities exist and to guide future noise sensitive development to appropriate and compatible locations. The contours should also be used to identify existing noise impact areas

that could benefit from noise insulation programs.

Policy 1.2: *Use the State Office of Noise Control Guidelines as a guide to assess development that will need additional noise study and mitigations.*

The City adopted the Guidelines in 1978. The Guidelines are used to assess the suitability of a site for new development and when used in conjunction with the noise contours will accurately identify areas that need additional noise study and mitigation. Noise mitigations include additional insulation, double glazing of windows and increasing building setbacks from the noise source. Mitigations should also be creative and attractive whenever possible and appropriate. Creative noise mitigation measures can include incorporation of fountains using water to mask freeway noise and noise walls of an appropriate scale painted with decorative murals.

Objective 2: Ensure that noise levels appropriate to protect the public health and well-being are maintained.

Policy 2.1 *Maintain a CNEL level of not more than 70 dBA, L_{eq} in residential areas.*

The Environmental Protection Agency established 70 dBA, L_{eq} as the maximum noise level that one could be exposed to continuously in order to protect the public health. Currently Daly City meets this standard except for the second story of homes located on Station Avenue where the L_{eq} reaches 72 dBA. Noise insulation programs should be encouraged in this area and future development should be mitigated appropriately or avoided in areas where the noise levels exceed 70 dBA, L_{eq}.

Policy 2.2: *Maintain a noise level not in excess of 70 dBA, CNEL in open space, parks and tot lots.*

The Guidelines identify 75 dBA, CNEL as the noise level that is 'Conditionally Acceptable' for parks and open spaces. Currently Daly City meets a more stringent criterion than this as Daly City's open space areas are between the 60 to 70 dBA, CNEL noise contour interval. The existing and projected noise contours indicate that the areas where the noise levels exceed 70 dBA, CNEL are within the road right-of-way and along Station Avenue. Existing and projected noise contours indicate that this criterion is currently and will continue to be met.

Policy 2.3: *Maintain the City's current standard of 75 dBA, CNEL for office, commercial and professional areas.*

The Guidelines identify 78 dBA, CNEL as the noise level that is 'Conditionally Acceptable' for office, commercial and professional land uses. Additional noise studies should be conducted in 'Conditionally Acceptable' noise environments to ensure adequate mitigation features are employed. Usually conventional construction with closed windows and fresh air supply systems will maintain a healthy noise environment.

Existing and projected noise contours indicate that Daly City's office, commercial and professional areas are located in noise contour areas from 60 to 75 dBA, and that the majority of these uses are within the 60 to 70 dBA, CNEL contour intervals. The City meets a stricter criterion than prescribed by the Guidelines and should continue to do so in the future.

Policy 2.4: *Require new development to perform additional acoustical studies in noise environments that are identified as 'Conditionally Acceptable' or 'Normally Unacceptable' in the Guidelines.*

The City, through the Planning Division, currently requires acoustical studies for proposed development through the discretionary review and California Environmental Quality Act processes. This procedure should continue to be employed and particular attention should be paid to borderline noise environments. Conditions and mitigations, as appropriate, should be attached to projects.

Policy 2.5: *Require proposed intensification of development and proposed new development in noise environments identified as 'Clearly Unacceptable' in the Guidelines to reduce ambient interior noise levels to 45 dBA, CNEL.*

Development should be discouraged or mitigated in a noise environment identified as 'Clearly Unacceptable' in the Guidelines. The 'Clearly Unacceptable' designation for most land uses is in excess of 75 dBA, CNEL. The existing and projected future noise contours identify one such area in Daly City; that being the second story of homes along Station Avenue. Intensification of development should be discouraged in this area unless noise mitigations are employed which clearly reduce the noise impact to an interior ambient level of 45 dBA, CNEL.

Policy 2.6: *Discourage noise sensitive land uses from locating in areas of inappropriate or high noise levels.*

This policy relates directly to uses sensitive to noise such as day care centers and extended care facilities such as group care homes in residential neighborhoods. Group homes of six or fewer occupants are allowed by right in residential neighborhoods in Daly City as a result of State law. Group care homes often provide an environment in which the elderly or disabled convalesce and day care centers provide a learning environment for children. Outdoor ambient noise levels for these types of uses should not exceed 70 dBA, CNEL. Although these uses are allowed by right, the City should encourage a potential care provider to maintain an appropriate noise environment.

Group care homes in excess of six are reviewed and conditioned by the City through the use permit process. In such cases the City should continue to attach conditions of project approval, if necessary, to maintain an appropriate noise environment.

Policy 2.7: *Avoid noise impacts from intensification or alteration of existing land uses.*

The City often receives applications for intensification or alteration of existing land uses. Some examples include converting a site used for car sales to a mixed-use residential and commercial development or addition of a car wash and mini-mart to an existing gas station. Depending upon the hours of operation, intensity of use, and the location of sensitive receptors in the area, the expansion or change of use could cause noise impacts. Acoustical studies should be performed, at the applicant's expense, during the discretionary and environmental review processes and conditions should be placed on the project accordingly.

Objective 3: Reduce aircraft noise exposure by five decibels.

Policy 3.1: *Participate in Regional Planning Committee activities.*

The City is currently a member of the Regional Planning Committee which is the designated Airport Land Use Commission for the County

of San Mateo. The RPC responds to airport matters, produces an airport land use plan, and develops policy in order to provide for the safe and orderly growth around airports. The City should continue this activity.

Policy 3.2: *Participate in the airport planning process.*

Active participation by affected municipalities and citizenry during the airport planning processes will assist in reducing noise impacts. The City has participated in airport planning processes by commenting on draft noise regulations, the proposed amendments to Title 21, the Airport Master Plan, and through the Regional Planning Committee. Participation such as this should be continued. The City should actively encourage the citizenry of Daly City to actively participate in the process.

Policy 3.3: *Coordinate, as appropriate, with other municipalities to facilitate an integrated effort to reduce airport related noise.*

Airport noise affects many cities in San Mateo County. Hours of airport operation and selection of flight paths used will affect different cities in different ways and to various levels of impact. There does exist, however, in some areas commonalties of impact, either in the types of noise regulation adopted by the airport or by the operating hours of the airport. Whenever possible these commonalties should be identified through staff meetings with various cities in order to develop an integrated approach to airport noise issues. Daly City, has in the past, worked with other cities such as South San Francisco, in responding to airport operations; this cooperative action should be continued.

Objective 4: Reduce surface-transportation-related noise levels along arterials and surface streets that experience a CNEL greater than 60 dBA.

Policy 4.1: *Improve and maintain surface streets in order to reduce noise.*

Improperly maintained streets add to the noise environment as vehicles travelling along them must adjust speeds accordingly. Acceleration, braking and idling of vehicles over what is required on well-maintained streets adds to the noise environment. Well maintained streets will reduce these types of noise impacts. This policy is linked to the transportation program 'Transportation System Improvements' which includes an inventory and target for improvement of roadways in Daly City. Priority should be given to resurfacing targeted streets which exceed the 65 dBA, CNEL contour.

Policy 4.2: *Coordinate with transportation policies in order to reduce commuter volumes and associated traffic noise.*

Traffic volumes sufficient enough to slow the traffic stream from the posted speeds adds to the noise environment. Increasing traffic volumes adds to the noise environment. Reducing traffic volumes will allow the traffic stream to flow at the posted speed and thus reduce noise levels accordingly. Transportation policies aimed at encouraging public transit use (Policy 3.1,); encouraging paratransit development and use (Policies 5.1, 5.2 and 5.3); and maintaining Level-of-Service C (Policy 2.1) will also reduce noise levels. Coordination between the transportation and noise policies should occur.

Policy 4.3: *Work with Samtrans and MUNI in the placement of bus stops in order to reduce noise associated with bus activity to noise sensitive receptors.*

Acceleration and deceleration of diesel buses produces intrusive noise and adds to the overall noise environment. Care should be taken in the placement of bus stops in order to minimize noise impacts on noise sensitive land uses such as residential areas; schools; hospitals and extended care facilities; and open spaces, parks and tot lots. Particular attention should be paid to increasing the distance of bus stops from residential and health-care-related-uses.

Objective 5. Promote regional cooperation in noise reduction.

Policy 5.1: *Coordinate with the Metropolitan Transportation Commission (MTC) transportation planning efforts of adjacent jurisdictions in order to reduce regional and local noise sources and impacts.*

The City is disected by Interstate 280; Route 1; and Route 35 which are major noise sources in Daly City. The City should support and participate in the efforts of MTC to coordinate regional transportation planning in as much as reducing the traffic stream that intersects the City will in turn reduce noise impacts experienced by the City. Planning for traffic along Interstate 280 should be given top priority as this interstate is the biggest generator of noise in Daly City. This noise policy relates directly to Transportation Policy 1.2.

Policy 5.2: *Participate in the environmental review process for the location of commuter facilities in order to ensure appropriate siting and /or mitigation of noise impacts as appropriate.*

Caltrain is looking at five alternative sites in which to relocate their maintenance yard. One of the sites in Brisbane, just south of the Bayshore neighborhood. BART is in the process of constructing a tail track in unincorporated Colma. Care should be taken during the environmental review process to ensure that the location of the facilities will not negatively impact Daly City's noise environment. Increased traffic along surface streets to either of these facilities could impact the noise environment. Residences near the tail track yard could be exposed to additional and intrusive noise from track activities.

The projected future noise contours indicate that noise in the Hillside area, near the tail track, will increase slightly. Although the noise environment is predicted to remain well under prescribed levels the environmental review process should identify mitigation measures in order to maintain current noise levels at 60 to 65 dBA, CNEL.

Noise Element Programs

Noise Programs are action programs defining what Daly City is doing or intends to do to implement the policies and achieve the Goal and Objectives of the Noise Element. The Noise Programs are organized into two major categories: Current Programs for Noise Reduction and Proposed Programs for Noise Reduction. The program identifies the specific action; the existing or anticipated funding source, as appropriate; the responsible agency; and, the time frame for each component. The following specific actions have been undertaken by Daly City in response to the needs of the noise environment.

Current Programs for Noise Reduction

Daly City Municipal Code

Chapter 9.22 of the Daly City Municipal Code contains language to protect residents from excessive noise exposure. Section 9.22.010 prohibits an individual from causing a disturbance such that it disturbs the public peace off-site. Section 9.22.020 states that no person shall maintain, operate, or conduct any loudspeaker or amplifier in such a manner as to cause the sound to be projected outside any building or out of doors in any part of the City without first obtaining a permit to do so. Section 9.22.030 deals more specifically with noise and states that between the hours of 10:00 P.M. and 6:00 A.M. no person shall cause, create, or permit any noise which may be heard beyond the confines of the property of origin. The Police Department enforces Chapter 9.22 of the Municipal Code.

Title 24 Noise Insulation Standards for Multi-Family Development

Title 24 of the California Administrative Code requires a particular set of noise insulation features be incorporated into multi-family residential construction. Additional noise insulation is required because multi-family development is usually permitted in a slightly noisier environment than single-family and because adjacent apartments are an additional source of noise in multi-family areas. Title 24 is prescribed by state law and enforced by the Building Division through the permit process and building inspection prior to issuance of the Certificate of Occupancy.

Discretionary Review of Projects

Title 17 Zoning of the Daly City Municipal Code provides for discretionary review of projects through the use permit and variance process. An application for development is analyzed in light of many concerns including comparing the proposed use against the noise contours and Noise Compatibility Guidelines. The Planning Division attaches conditions of project approval to reduce noise impacts to future occupants of the proposed development as well as conditioning times construction activities may occur in order to reduce noise impacts to surrounding land uses.

California Environmental Quality Act Review

The California Environmental Quality Act (CEQA) mandates an initial study be prepared on all projects except for those that are administrative. Administrative projects are projects that are allowed by right in a particular zoning district for which an applicant need only apply for a plan check and a building permit. The courts however, in the recent past, have interpreted the law to include administrative projects of substantial size or magnitude to be included under the provisions of CEQA.

An initial study is prepared for such projects and based upon the findings of the study, the project is conditioned accordingly. If significant potential impacts are identified an environmental impact report is required. Mitigations are applied to the project accordingly.

Environmental impact reports are an important tool when assessing potential noise impacts from proposed development projects. A noise study is conducted, if determined necessary. A

noise study usually involves actual noise measurements of the existing noise environment in the vicinity of the proposed project. Population and traffic projections are used to determine the percent of increased vehicle trips in the project area, or project region depending on the size or type of the proposal. The extent that vehicular traffic increases has a direct quantifiable bearing on the potential noise impacts of a proposed project. Traffic data, including traffic speeds, and percent of trucks present in a traffic stream, is entered into a computer model. The end result of the modeling is a reasonable projection of the noise impacts associated with a particular project.

The projected noise environment is then compared to the state Noise Compatibility Guidelines, for the particular land use in question. A project may go forth without additional noise insulation or mitigation features if the noise level is within the 'Normally Acceptable' range. The 'Conditionally Acceptable' range sometimes requires additional noise reduction requirements while the 'Normally Unacceptable' and 'Clearly Unacceptable' noise ranges provide a basis to deny a project in terms of noise impacts. Noise reduction techniques can include additional insulation, double glazing of windows, increasing building setbacks from the noise source, altering the placement of the buildings in order to utilize noise reflection in a beneficial manner, and construction of a sound wall. If noise generated from a proposed project is determined to have a significant unavoidable impact in other areas, and it is an impact that can not be mitigated, the project may be denied.

Noise, of course, is not the only consideration when determining the merits of a particular project. Approval or denial of a project requires weighing all the potential impacts and benefits of a project. Benefits and impacts may occur in areas such as housing and density; land use compatibilities or incompatibilities; air quality, circulation, transportation and parking; socio-economics such as the location of job force, economic impacts or benefits to the city or region; the consideration of public services and infrastructure available to support the project; the location and extent of natural and man made hazards, such as earthquake and slide areas or the presence of hazardous materials.

Proposed Programs for Noise Reduction

The following specific actions will be undertaken by the City in order to implement the policies outlined in this element.

Apply Title 24 Noise Insulation Standards to Single-Family Development

Objective: Insure ambient interior noise levels sufficient to protect public health in single-family development
Responsible Agency: Planning Division, Engineering Division, Building Division
Time Frame: 1988-Continuous
Funding Source: Developer
Activity:

Title 24 noise insulation standards are required by state law to be applied to multi-family residential development. These same standards can be applied to single-family development in appropriate cases to insure that the interior ambient noise levels are sufficient to protect the residents from adverse noise impacts. Title 24 would not be applied in every case; but in cases where new residential development is proposed in a noise environment above 60 dBA, CNEL. The Planning and Engineering Divisions would identify the project, through discretionary or California Environmental Quality Act review, where this condition or mitigation should be applied. The Building Division, through plan check and building inspection, would insure that the standards were being incorporated in building design and construction.

Apply for Federal Monies to Retrofit Homes Affected by Aircraft Noise

Objective: Reduce noise levels to homes affected by airport noise
Responsible Agency: Department of Economic and Community Development
Time Frame: 1988-1989
Funding Source: City and County of San Francisco, Federal Aviation Administration, Private Funds
Activity:

The City has applied for federal monies to retrofit homes that are affected by aircraft noise. Homes affected by aircraft noise in Daly City are located in the southeastern portion of the City. The program consists of installing additional noise insulation to homes. The City and County of San Francisco would pay 20 percent of the costs and the Federal Aviation Administration (FAA) would supply the remaining 80 percent.

Under FAA guidelines retrofit homes must be within the 65 dBA, CNEL contour area. At this time it is questionable if the City falls within this noise contour. A final determination will be made by the FAA.

Amend the Municipal Code to Include Standard Noise Conditions for Construction Activities

Objective: Enforce unilaterally noise control measures for all construction related noise
Responsible Agency: Planning Division, Engineering Division, Building Division, City Attorney
Time Frame: 1988-1989
Funding Source: General Fund
Activity:

Currently through the Planning and Engineering Divisions the City enforces construction related noise by attaching conditions to project approval. The conditions regulate the time that grading and site preparation activities may occur; times that machinery may be started up; and the times that cleaning and shut-down may occur. The conditions protect surrounding properties from excessive noise after 5:00 P.M. Monday through Friday and on the weekends. There are provisions for emergency work provided the developer or the contractor secure permission from the City Engineer and certain findings are made.

Amending Chapter 15 Building of the Municipal Code would apply these types of noise conditions to all construction. The Engineering and Planning Divisions and the City Attorney would draft language for adoption. The City would adopt the changes by ordinance and the provisions would be enforced by the Building Division through the building permit process.

Appendix A

TECHNICAL GLOSSARY

A-Weighted Sound Level (dBA) is the sound pressure in decibels as measured on a sound meter using the A-filtering network. The A-filtering network de-emphasizes the very low and very high components of sound in a manner similar to the response of the human ear. The acronym dBA accompanies a given measurement or calculation and indicates a particular noise level measured with an A-filtering device.

Absorption reduces (attenuates) noise. Some portions of sound energy that strike a surface are converted to heat (thermal) energy rather than being reflected as noise; this reduces the amount of energy that is heard as noise. Absorptive materials include thick glass, spun fiberglass and materials such as upholstered furniture (as opposed to wood furniture), drapes and carpeting.

Airborne sound is sound that reaches the point of interest by travelling through air.

Ambient Noise Level constitutes the "normal" or "background" noise components and level of noise at a given location. Ambient noise is a composite from all noise sources that are experienced in a given location. Ambient noise in a residential area, for example, could consist of sounds of people talking, dogs barking, children playing and cars passing by. Ambient noise in an office might consist of people talking, telephones ringing, and the sound of typewriter or computer keyboards clicking. Ambient noise in a cabinet shop could include saws, grinders, drills, sanders and people shouting.

Attenuation refers to the lessening or reduction of a noise level. Noise attenuates by travelling a distance from the source or by other mechanisms such as ***absorption*** or ***reflection***. The placement of buildings, sound walls, and noise insulation features are predicated on noise attenuation. Noise will attenuate at different levels depending if the noise source originates from a ***point*** or ***line*** source and if it travels over a ***hard*** or ***soft*** surface and if it is ***absorbed*** or ***reflected*** by a noise mitigation feature. Basically five things are taken into consideration when calculating noise attenuation: the type of noise; level of noise at the source; distance the noise travels to the point of interest; type of terrain over which the noise travels; and the presence or absence of noise barriers.

Building Envelope is a technical term which refers to the components of a building such as the foundation, walls, windows and insulation and is an important concept in noise ***attenuation***. Portions of the building envelope will reflect noise, some portions will absorb noise and some noise will be transmitted through to the interior of the building. This term is discussed further in the following section, as characteristics of the building envelope have an important impact on noise reduction for residential, and other, areas.

Community Noise Equivalent Level (CNEL) is the average equivalent A-filtered sound level during a 24-hour period. The value is obtained after the addition of 5 ***decibels*** to sound levels in the evening from 7:00 P.M. to 10:00 P.M. and after the addition of 10 decibels in the night after 10:00 P.M. and 7:00 A.M.. The CNEL weights the actual noise measurements taken to account for the increased sensitivity people have to noise during the evening and nighttime hours. Daly City's Noise Element employs this noise weighting metric.

Cycles per second is a measure of frequency numerically equivalent to ***hertz***.

Decibel is a logarithmic unit of sound intensity. Sound waves travel out from a source and exert a force known as sound pressure. The sound pressure level of intensity is measured in decibels and is usually referred to as the sound level.

Doubling Distance refers to the doubling of a given distance (in feet) from a particular noise source. Doubling distance is used to calculate the amount noise will attenuate (reduce) from the noise source to the noise receiver.

Day Night Average Noise Level (Ldn) is the average equivalent A-filtered sound level during a 24-hour period obtained after the addition of 10 ***decibels*** to sound levels in the night after 10:00 P.M. and before 7:00 A.M.. The Ldn weights noise measurements taken to account for the increased sensitivity people have to noise during the nighttime hours.

Energy Equivalent Noise Level (Leq) is the sound level corresponding to a steady state sound level containing the same total energy over a given period of time.

Environmental noise is a combination of noise from various sources which produce a relatively steady or ***ambient*** noise level. Environmental noise is a term often uses to describe outdoor ambient noise that one experiences in our daily environment.

Frequency is the number of times per second that the sine-wave of sound repeats itself, or that the vibrating object repeats itself. Frequency is expressed in ***hertz (Hz)*** and was formally expressed in ***cycles per second***.

Hard surfaces (terrain) include paved surfaces and concrete buildings. Hard surfaces reflect noise and tend to ***absorb*** less noise than do ***soft surfaces*** and thus, in the absence of other noise mitigation features, tend to ***attenuate*** noise less than soft surfaces. The importance of hard or soft surfaces comes into play in absence of other noise attenuation features and are most important when calculating noise attenuation due to distance from the noise source.

Hertz (Hz) is the unit of measurement of frequency numerically equal to ***cycles per second***.

Intrusive noise is a noise that intrudes over the existing ***ambient*** noise in a given location. The relative intrusiveness of the sound depends upon the amplitude, duration, frequency and time of occurrence of the intrusive noise as well as the level of the ambient noise.

Line of site is often used when describing the noise source and noise receiver relationship. Basically, if one can see the noise source then one can hear the noise; if however, the line of sight is broken by a wall, building, mountain, or other barrier, then the noise source is reduced accordingly. Various features reduce noise at different levels and these differences are discussed throughout this noise element.

Lmax is the highest noise (sound pressure) level recorded during the measurement period. The Lmax, then, represents one intrusive noise event, there may be others of less intensity, during the measurement period. Intrusive noise can typically be from such sources as an aircraft flyover, a horn or siren, or construction activities.

Line source is a noise originating from a line such as a stream of moving traffic, a moving train, conveyor belt, or even a river. Noise from a line source produces parallel sound waves moving linearly outward from the source. Noise will ***attenuate*** 3 dBA per doubling of distance from a line source in ***hard terrain*** and approximately 4.5 dBA per doubling of distance in ***soft terrain***. The significance in the distinction between a line and point surface is the rate of attenuation.

Noise is a sound that is undesirable because it interferes with speech or hearing, or has the intensity or duration of such to damage hearing, or, is otherwise annoying.

Noise Compatibility Guidelines, developed by the State Office of Noise Control, establish certain criteria for noise levels with regard to land use compatibility. Each category of land use enjoys a range of noise levels considered compatible with the use and the noise levels may increase provided certain noise insulation features are employed. Daly City has adopted the Noise compatibility Guidelines.

Noise exposure contours are lines drawn about a noise source which indicate a constant level of noise exposure. Noise contours are similar to contours drawn on a topographical map which represent areas of the same elevation. Noise contours are significant inasmuch as they indicate areas where noise mitigation measures may be needed and they indicate what types of land uses are subject to particular noise exposures.

Point source noise originates from a single source such as a horn, motor and machinery. Point source noise produces spherical waves which travel outward in a circular pattern from the source. Point source noise ***attenuates*** approximately 6 dBA per doubling of distance from the source in ***hard terrain*** and approximately 9 dBA per doubling of distance in ***soft terrain***. The significance in the distinction between a ***line*** and a point source is the rate of attenuation.

Reflection is a method that can reduce noise. Noise strikes a hard surface and is reflected back toward the source of the noise. Reflection can reduce noise in one area while adding noise in another area.

Sensitive receptor includes people engaging in activities that are sensitive to noise. Residential areas, hospitals, extended care facilities, schools, libraries and open spaces are land uses sensitive to noise.

Soft surfaces (terrain) includes surfaces such as barren earth, soil, landscaped areas, and acoustically absorptive materials. Soft surfaces absorb more sound energy than ***hard surfaces*** and thus more noise is attenuated in a soft environment. The importance of hard or soft surfaces comes into play in absence of other noise attenuation features and are most important when calculating noise attenuation due to distance; the further one is from the noise source the lesser the noise level (sound energy) at that location.